→ Bill Werrell

March 3 1849

United States Department of the Interior
NATIONAL PARK SERVICE
DENVER SERVICE CENTER
755 Parfet Street
P.O. Box 25287
Denver, Colorado 80225-0287

IN REPLY REFER TO:

D50 (DSC-TWE)
YOSE-504AA-06

SEP 18 1986

Memorandum

9/22/86

To: Chief, Water Resources Division, Fort Collins

From: Assistant Manager, Western Team, Denver Service Center

Reference: Yosemite National Park, Package 504AA, Comprehensive Design, Survey Roads and Utilities, El Portal

Subject: Cover Letter to Seismic Report by Gasch and Associates

Attached is a copy of the cover letter to the Seismic Report by Gasch and Associates. It should be inserted into Appendix A of the report "Geology and Seismic Reconnaissance for Water Supply for Yosemite National Park El Portal Area" by Alvin L. Franks. This report was transmitted to you on August 22.

Caleb G. Cooper
Caleb G. Cooper

Attachment

cc:
Reg. Dir., Western Region
Supt., Yosemite NP

GEOLOGIC AND SEISMIC RECONNAISSANCE FOR WATER SUPPLY FOR YOSEMITE NATIONAL PARK EL PORTAL AREA

by Alvin L. Franks, Ph.D.
CEG # 88

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Figure 1 -- In pocket

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http://archive.org/details/geologicseismicr00fran

GEOLOGIC AND SEISMIC RECONNAISSANCE FOR WATER SUPPLY FOR YOSEMITE NATIONAL PARK EL PORTAL AREA

by Alvin L. Franks, Ph.D.
CEG # 88

INTRODUCTION

The existing water supply for the El Portal Area is from shallow wells which produce a total of 235 gal/min. The National Park Service, Yosemite National Park, will require an additional 240 gal/min for future uses in this area.

A prior study was conducted by the USGS in 1973. It was published as an Administrative Report entitled, "Summary of Water Supply Studies in Yosemite National Park, California", by E.J. McClelland and William R. Hotchkiss. This report contained one page of information on the water supply at El Portal. Four test holes were drilled near the store next to the highway at El Portal. None of the test holes yielded sufficient water to warrant development. Another test hole was drilled 0.8 miles down stream. The report indicated that this boring was drilled to a total depth of 150 feet. The well log submitted to the State of California, State Well No. 76399. shows a total depth of only 106 feet The only water found was in the top 55 feet of the alluvial material. There was no water in the bed rock. After surging and cleaning, the well was test-pumped at 76 gal/min.

There are four producing wells in the National Park

service water system at El Portal. They were drilled into the alluvial material and extract water from the area above the granitic and metamorphic bed rock. The well logs show that the water bearing material above bed rock is, at most, 65 feet thick. The total production of the existing National Park well system is 235 gal/min.

There are two other wells in the area. One is a producing well located between the general store and the National Park Service office at El Portal. The other is a nonproducing capped well located to the east of the Merced River and north of the cement bridge up stream from the large mobile home park.

GEOLOGY

The two bed rock units in the El Portal area are the Cretaceous granitic rocks to the east and Paleozoic metamorphic rocks of the Calaveras formation to the west of El Portal. The sides of the river gorge and the river bed contain both Recent river bed deposits and glacial deposits of Pleistocene age. The only significant quantity of ground water found is in the Pleistocene or younger deposits.

The granitic rocks are relatively unweathered and widely jointed. The rocks of the Calaveras formation consists of mostly black carbonaceous phyllite with interbedded metachert. Where exposed, these rocks seem to be only slightly weathered.

Glaciers advanced down the Merced Canyon at least three and perhaps four times. The later stages of

glaciation only partially filled the Yosemite Valley and did not extend down the canyon to the El Portal area. At least one stage of glaciation reached down stream to the bend in the river, at the gravel pits, to the west of El Portal. Little remains of the oldest moraines except scattered boulders.

The glaciers changed the shape of the Merced Canyon. They ground off projecting spurs, plained back parts of the walls and gave the valley the characteristic "U" shape. As stated by Calking and Peck, (Calif. Mines and Geology Bulletin #182) the joint spacing and rock type controlled the rate and type of cutting. The Merced Canyon was cut into rocks with widely spaced joints in the gorge between El Portal and the mouth of Cascade Creek. Its cross profile is still essentially "V" shaped in this reach although morainal deposits on the walls of the gorge show that it was occupied by an earlier glacial stage.

Glacial erosion of bed rock is mainly by quarrying and plucking, with joint blocks being lifted into the glacier by freezing of water in the cracks between the joints. The greatest deepening and widening of the valley occurred where the rocks were more closely jointed.

During the glacial advances and retreats, the river was loaded with large quantities of coarse debris delivered to it by the Glacier. This material formed an extensive valley train on the floor of the canyon, aggrading its bed. Remnants of this valley train show up

as patches of outwash gravel preserved against the walls of the canyon downstream from El Portal.

FIELD RECONNAISSANCE

A field reconnaissance of the El Portal area was made on May 24 and 25, 1986, to determine the areal geology and geomorphology of this section of the Merced River canyon.

There are six bends or meanders in the river in the two mile reach up and downstream from El Portal that are filled with the glacial outwash deposits and more recent material. The erosion and past glacial action on the river bed cut into the bed rock system with some widening of the river valley. The River cut these meanders during periods of runoff with much higher flows than now exist. There is also the possibility that the glaciation plucked some of the bed rock from the bottom of the canyon deepening some areas of the river bed similar to that found further upstream. This could be a mechanism that could have taken place in the El Portal area where the metamorphic rocks were observed to have a closer joint system than the granitic rocks.

There is one area in the bend of the river at the mobile home park where granitic material is exposed along the northern (outer curve) bank. The exposed metamorphic rock, both east and west of the exposure, are highly fractured and jointed.

The river bed and the adjacent flood plains are choked with boulders, with some up to 8 feet in diameter. The drilling logs of the existing wells show that a cable

rig was used to drill through these materials. The logs indicate everything from packed clay to to dry boulders. Most of the water produced from the wells was found in sand and gravel below 45 feet in depth.

The field study of the area indicated that the best opportunity for finding potential well sites would be in the larger meanders of the river. These areas have be cut and backfilled with sediments and should have the greatest thickness of sedimentary material above the bed rock system.

The only meander not examined was the one to the south of the river and east of the Standard Station. There was no access except by a single cable crossing the river near the western end of the meander. The local National Park personnel indicated that the car and cable system for transport over the river was not available. They also indicated that the area had some archaeologic significance and probably could not be developed without extensive study. The next meander to the east was added to the study area as a replacement.

All of the producing wells drilled in the El Portal area are extracting water from sediments up to 65 feet in depth and are bottomed in bed rock. None of the wells show any production of water from the bed rock. The county requires a 50 feet sanitary seal for water wells being used for municipal use. An exemption from this regulation can be obtained, if it is shown that there will

be no contamination by infiltration of surface and near surface water. If the 50 feet sanitary seal is required, any future wells will have to be in areas where there has been erosion and back filling of at least 55 feet of material.

Well logs are available for the five wells drilled for the National Park Service. They are included in Appendix B of this report.

Well No. 075889 is located in the gravel pit area down stream from the mobile home area. It is south of the river and between the river and Highway 140 (see figure 1). The test after drilling indicated a production rate of 105 gal/min after 8 hours of pumping.

Well No. 075899 is located near the entrance road to the mobile home park, between Highway 140 and the park (see Figure 1). The test after drilling indicated a production rate of 45 gal/min after 8 hours of pumping.

Well No. 76399 is located 40 feet east of the river and 600 feet downstream from the concrete bridge upstream from the mobile home park (see Figure 1). The test after drilling indicated a production rate of 76 gal/min with a drawdown of 37 feet after 10 hours of pumping.

Well No. 075821 is located 430 feet upstream from Well No. 76399 (see Figure 1). The well is capped and is not in use at this time. The test after drilling indicated a production rate of 48 gal/min with a drawdown of 30 feet after .19 hours of pumping.

Well No. 075898 is located 1000 upstream from the

concrete bridge east of the mobile home park and 80 feet north of Highway 140 (see Figure 1). The test after drilling indicated a production rate of 100 gal/min after 8 hours of pumping.

SEISMIC STUDY

Four of the river meanders, as shown on Figure 1, were selected to run refraction seismic studies. The location and lengths of the lines "A" through "F" are also shown on Figure 1. The large meander, located on the south side of the river to the east of El Portal, was not included in the study because of lack of access and possible archaeologic conflicts.

All of the selected sites to the west of El Portal are in areas with metamorphic bed rock cropping out in the hills above the river. However the one outcrop or granite in the bend of the river at the mobile home area and the data from the well logs indicate that granitic rock underlies most of this area. The one site selected to the east is underlain by granitic bed rock. All of the sites show lateral erosion of bed rock and back filling of the river valley with water bearing materials.

The seismic survey was conducted on June 5 and 6, 1986 by Gasch and Assoc. The results of this study are attached in Appendix A. All available well logs were provided to Gasch and Associates and are included in Appendix B.

The seismic line at "A", is located to the west of the Mobil Home area. It was run between the road and the

river and parallel to the road (see Figure 1).

The calculations from the data shows the depth to bedrock in excess of 60 feet between stations 7 and 13. This zone is located 180 to 320 feet north of the the pavement of Highway 140. The elevation of bed rock rises both north and south of this low spot. There is also a possibility that the bed rock surface is at a lower elevation below the existing river bed.

Seismic line "B", is located through the center of the mobile home park area. The line runs northerly from a point 60+ feet west of Well No. 4 (State Well No.075889) to the road near the river (see Figure 1).

The well log of Well No. 4 shows a depth of sediment over bed rock of 65 feet. The calculations from the seismic data shows a relatively uniform depth to bed rock of 60 to 75 feet between stations 1 and 16.7. This would be located 0 to 370 feet north of the main road in the mobile home park near the existing well. The deepest areas are located at Stations 6.5 (75 feet) and 15 (70 feet). This would be 150 feet and 350 feet respectively along the seismic line north of the road.

Seismic line "C", is located along the river to the east of the Mobil Home area (see Figure 1). A successful seismic survey could not be run. A 480 feet long line was laid down and tested. However, the high river flow produced too much noise to filter out of the seismic system. Some data at Stations 6 through 12 indicated depths to bed

rock of over 50 feet. If additional well sites are required for future expanded use, a seismic survey of this area can be made during low flow conditions when there is less background noise.

Seismic line "D" was run in a southeasterly direction from Well House No. 2 (State Well No. 76399) to the intersection of the roadway at the gate to the entrance road at Highway 140 (see Figure 1). The line also passes by the unused well (State Well No. 075821). Station 1 is located at the well house with the line running in a southeasterly direction towards the highway. The log of Well No. 2 shows sand and gravel at 49 to 55 feet and granite at 55 feet. The total depth of this well is 106 feet. No water is produced from below 55 feet. The seismic survey shows a depth to bed rock of 50 feet at this location.

The calculated depth to bed rock from the seismic data at the well casing (State Well No. 075821) at station 18 was only 40 feet. This is the location of the "extra" well reported by the USGS. The depth to bed rock was shown at 65 feet in the well log. The well log also shows gravel and cobbles from 43 to 48 feet, soft-sand or decomposed granite 48 to 49 feet and sand and gravel or loose decomposed granite from 49 to 55 feet.

The calculated depth to bed rock at station 20 was in excess of 70 feet with an indication of deepening closer to the highway. Based on the calculations from the seismic survey compared to the data from Wells No. 76399 and No. 075821, the total depth to bedrock could be over 80 feet.

The last calculated data point showing the 70+ feet depth of sediments was 100 feet northwest of the edge of the highway and over 600 feet west of the well house of Well No. 1 next to the highway.

The well log Well No. 1. (State Well No. 075898) shows solid rock at 83 feet overlain by "Hard Brown Clay-Rock Mixture" between 63 and 83 feet. The well openings (slots) were placed between 48 and 66 feet from the surface, indicating a water bearing zone extending to a depth of at most 66 feet. The zone between 63 and 83 feet is probably weathered in place granite. This well produced 100 gal/min during an eight hour pump test

The proposed seismic line "E" could not be run because of lack of room or access. The distances between roadways, the river, and other obstacles would not permit long enough lines to measure depths of 50 feet or more.

The USGS report indicated that 4 wells were drilled along Highway 140 near this line. None of these wells yielded sufficient water to warrant development. It was noted during the field reconnaissance that there was a producing well located between the general store and the Yosemite National Park Office. There is no data available on the depth, materials penetrated, or production rate for this well. There is still a probability that there are sediments thicker than 60 feet between the road and the river. If additional water is required in the future a test well at this location could be an option.

Seismic survey line "F" is located about 1 mile to the east of line "E" (see Figure 1). This line was run to the south 550 feet from the PG & E vault to the river. The data shows the depth to bed rock greater than 60 to 70 feet from 140 to 300 feet south of the edge of pavement of Highway 140. The data shows that the depth of sediments decreases from 70 feet at the 300 feet distance to less than 50 feet at the river.

CONCLUSIONS AND RECOMMENDATIONS

The information obtained from the geologic reconnaissance and the seismic survey shows that there are at least 5 areas where the overlying water bearing materials are in excess of 60 feet thick over bed rock. Any new wells drilled at these locations would not interfere with other well yields.

All the sediments in the meanders were deposited in about the same environment. Therefore, it can be assumed that these locations have the same water bearing materials found in the existing nearby wells. Under these conditions, any well drilled and developed at these locations could produce 60 gal/min or more.

It is recommended that the best sites for new production wells would be at the following locations and in the order presented:

1. Seismic line "D" at Station 22 about 50 feet northeasterly from Highway 140; This well should be drilled to bed rock (80+ feet). It is estimated that the yield will be between 100 to 150 gal/min.

2. Seismic line "A" at Station 10, about 250 feet from the edge of Highway 140; This well should be drilled to bed rock (70-80 feet). It is estimated that the yield will be between 75 to 120 gal/min.

3. Seismic line "F" at Station 12 about 240 feet south of the PG & E vault; This well should be drilled to bed rock (70-80 feet). It is estimated that the yield of this well will be between 60 and 120 gal/min.

4. Seismic line "B" at Station 15 about 350 feet north of the roadway at the mobile home park; This well should be drilled to bed rock (70-80 feet) It is estimated that the yield of this well will be about 60 to 100 gal/min.

5. Seismic line "B" at Station 5, about 100 feet north of the roadway at the Mobil Home park; This well should be drilled to bed rock (70-80 feet). It is estimated that the yield of this well will be about 50 to 80 gal/min.

WELL DRILLING AND CONSTRUCTION

Because of the nature of the sediments, the most economic method of drilling water wells would be either with a cable rig or a down hole rock hammer with a casing driver. A reverse circulation rotary drill rig using air and/or drilling mud could also be used. However the cost would be higher than the two previously mentioned drill rigs.

The surface casing should be at least 16 inches in

diameter and carried to a 50 feet depth to provide for the required sanitary seal. A geologist must be on site during drilling to collect samples and to provide well completion design data. If a down hole hammer or reverse circulation air rig is used the geologist can also make a good estimate of the quantity of water that can be produced by the well. It is not possible to measure the flow to the surface during drilling operations if a cable rig is used.

A minimum casing diameter of 8 inches should be used for completion of the boring. This casing should be either stainless steel or equivalent. Stainless steel screen or equivalent, with 0.045 slots should be used in the producing zones. If there is caving, flowing sand, or other problems during drilling below the surface string, it may be necessary to drill and drive a 10 inch casing to the total depth to hold the hole open. This casing would then be slot perforated. The production casing would then be placed and the the screened section backfilled with a sand or gravel pack. If the 16 inch hole below the surface casing remains open, the production casing and screen can be installed and sand or gravel pack placed up to the bottom of the surface casing.

After the production string has been set and the sand or gravel pack placed, the annular space between the casings above the well screens should be backfilled with a cement-bentonite mixture containing 100 pounds of bentonite per cubic yard of cement. The well should be left idle for at least 10 days for the cement to set.

At that time the well should be developed using either a surge block or air surge to remove the fine material near the screen and to develop a natural gravel pack around the screen. The well than can be pump tested for final determination of sustained yield of the well.

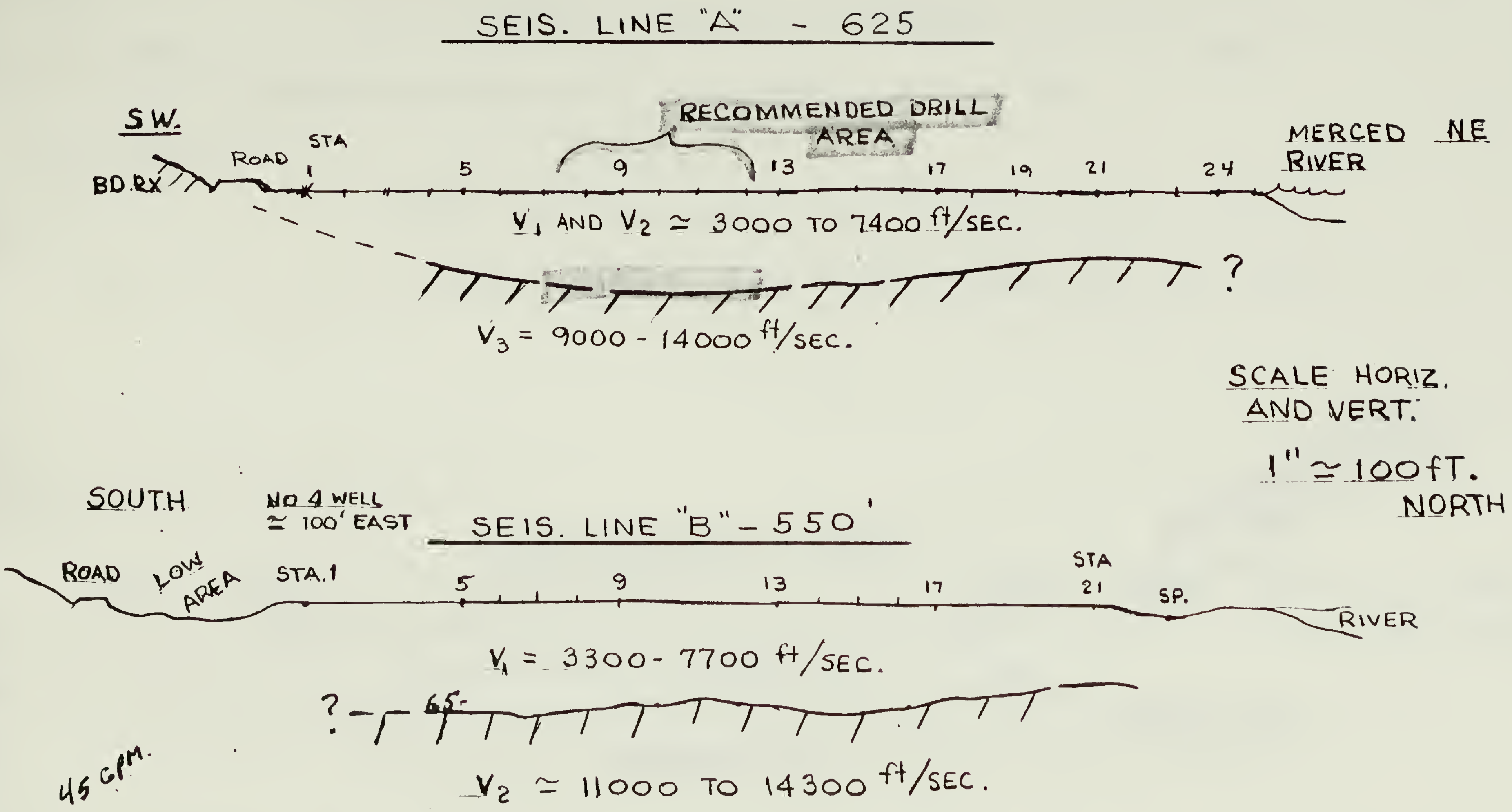
This data then can be used for the design of the pump and controls required to deliver water to the El Portal water system.

APPENDIX A

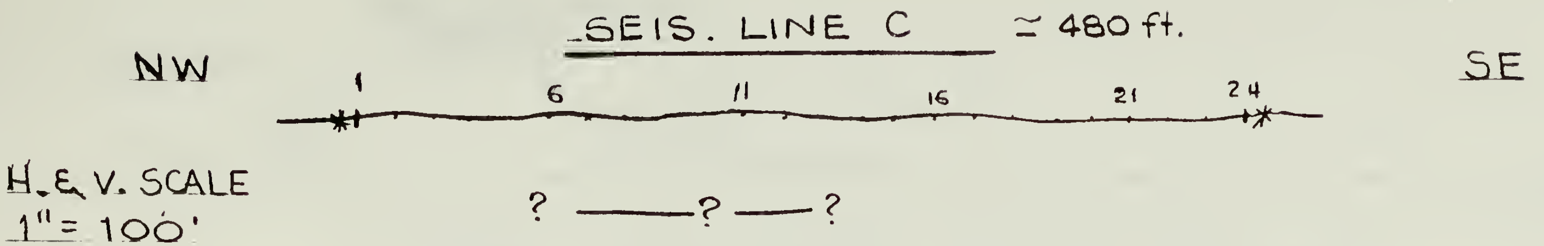
SEISMIC SURVEY REPORT

One page report with certification by Gasch and Associates----

Will be sent July 29, 1986 when Mr. Gasch returns to Sacramento.

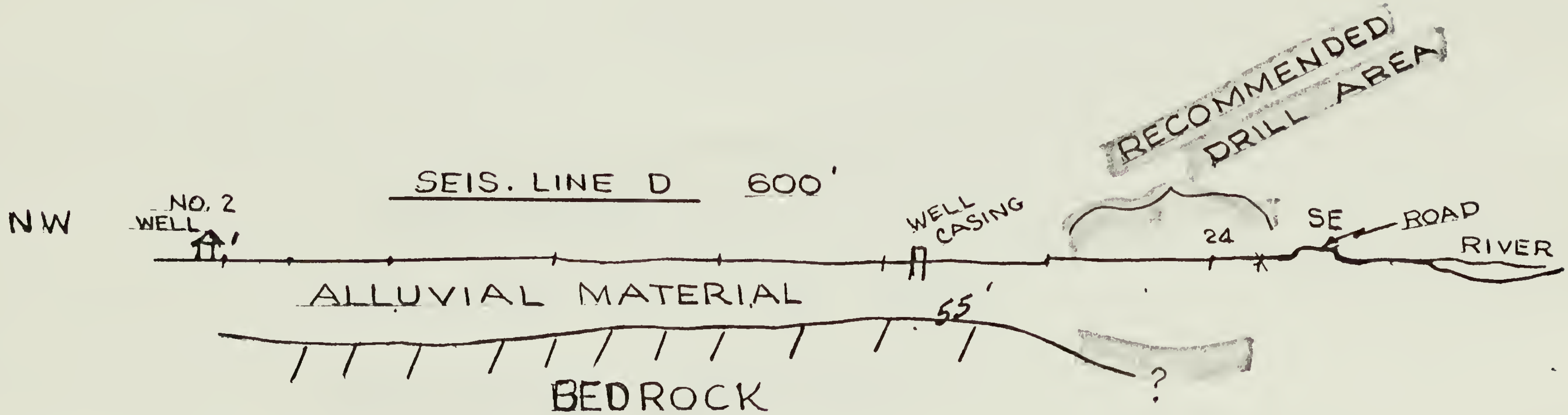

SEIS. LINE "A" - 625
SW.
BD.RX
ROAD
STA 1
5
9
13
17
19
21
24
RECOMMENDED DRILL AREA
MERCED RIVER
NE
V1 AND V2 ≃ 3000 TO 7400 ft/SEC.
?
V3 = 9000 - 14000 ft/SEC.
SCALE HORIZ. AND VERT.
1" ≃ 100 fT.
SOUTH
NO 4 WELL ≃ 100' EAST
SEIS. LINE "B" - 550'
NORTH
ROAD
LOW AREA
STA.1
5
9
13
17
STA 21
SP.
RIVER
V1 = 3300 - 7700 ft/SEC.
?
65
V2 ≃ 11000 TO 14300 ft/SEC.
45 GPM.

G. & A INC.
6-10-86



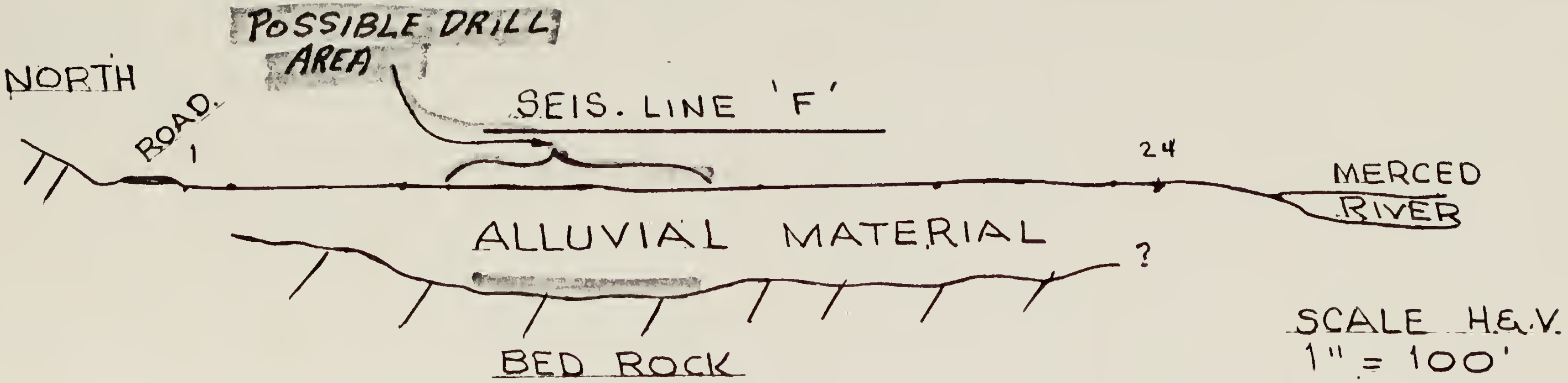
DATA NOT RELIABLE DUE TO EXCESSIVE NOISE

FROM RIVER ≃ 50 FT. AND PARALLEL TO LINE



SCALE
HORZ. & VERT.
1" = 100'

G. & A. INC.
6-10-86



NO DATA AT

LOCATION "E" NO ROOM

OR ACCESS AVAILABLE

G & A INC.

6-10-86

APPENDIX B

WELL LOGS - STATE

INDEX

Page

1 ----------------State Well Log No. 075889

2 ----------------State Well Log No. 075899

3 ----------------State Well Log No. 76399

4 ----------------State Well Log No. 075821

5 ----------------Field Log of State Well No. 075821

6 ----------------Screen data for State Well No. 075821

7 ----------------State Well Log No. 075898

3rd completed well
(SiTe #3)

ATE
ler's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 075889

e of Intent No. 175662

Permit No. or Date —

State Well No.

Other Well No.

OWNER: Name Yosemite NATional PARK

ess 755 PaRFet St. U.S. Dept of InTeRior

Denver Colorado Zip 80225

LOCATION OF WELL (See instructions):

ty MARiPOSA Owner's Well Number #3 (SiTe #3)

address if different from above EL PoRTAL CaliFornia

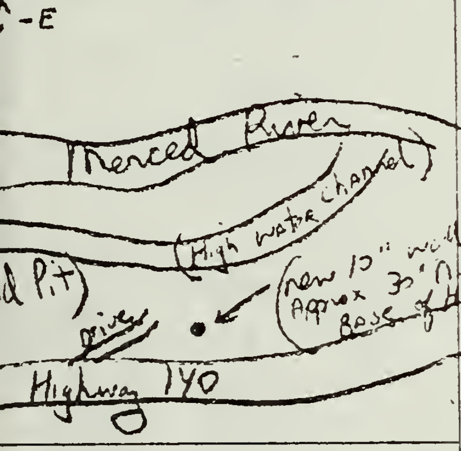
nship Range Section

nce from cities, roads, railroads, fences, etc.

Orl 10" well at "BAR Pit" (Gravel Pit)

between Highway 140 & Merced River Toward

1/2 mile West of EL PoRTAL Trailer Park.



WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well ☑ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic ☑
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(12) WELL LOG: Total depth 75 ft Depth of completed well 66'2" ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	10	Boulders (some gravel) } no H₂O
10	18	Gravel Cobbles & Rocks
18	21	Black Shale
21	27	gravel - Brown Clay
27	32	White Coarse sand & Gravel (Water Level = 13')
32	37	Small gravel · Sand - Some 4" Rocks (water level 13',
37	47	Coarse Sand - Some Pea Gravel (13' water Table)
47	50	Brown Rock (30' water Table)
50	54	Rock & Sand mix (13' water TA
54	58	4" Gravel (13' water Table)
58	63	Fractured Rock (makes wat
63	75	Dark Blue granite (Bed Roc

EQUIPMENT:

ry ☐ Reverse ☐
le ☑ Air ☐
r ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☐ No ☑ Size

Diameter of bore

Packed from ___ to ___ ft.

CASING INSTALLED:

l ☑ Plastic ☐ Concrete ☐

(8) PERFORATIONS:

Type of perforation or size of screen (Johnson Screen)

rom ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
)	42'	10 3/4"	.365	40'0"	66'2"	(26' 2" long)
3/4" (casing left 2') above ground						

(40 - 41'9" = 0 Slot
41'9" - 53'2" - #30 Slot
53'2" - 63'2" = #40 Slot
63'2" - 66'2" = 0 Slot)

WELL SEAL: (0 - 25'11" 14", .375 wall)

surface sanitary seal provided? Yes ☑ No ☐ If yes, to depth ___ ft.

e strata sealed against pollution? Yes ☐ No ☐ Interval ___ ft. (Cement)

od of sealing

) WATER LEVELS:

th of first water, if known — ft.

ding level after well completion 9' ft.

) WELL TESTS:

well test made? Yes ☑ No ☐ If yes, by whom?

of test Pump ☑ Bailer ☐ Air lift ☐

th to water at start of test 9' ft. At end of test 9 ft

harge 105 gal/min after 8 hours Water temperature

nical analysis made? Yes ☑ No ☐ If yes, by whom? Morse LAB

electric log made? Yes ☐ No ☑ If yes, attach copy to this report

Work started 9/15 19 80 Completed 10/9 19 80

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED M. E. Seebek Jr.
(Well Driller)

NAME M. E. SEEBECK & Sons
(Person, firm, or corporation) (Typed or printed)

Address PO Box 552

City Clarksburg CALiF. Zip 95612

License No. 222691 Date of this report 10/31/80

R 188 (REV 7-76) IF ADDITIONAL SPACE IS NEEDED. USE NEXT CONSECUTIVELY NUMBERED FORM

eted well (site #1) (2nd completed well) #4

ATE
ner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill

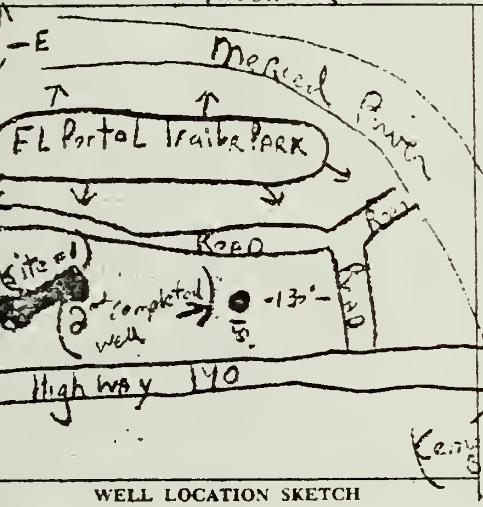
No. 075899

ice of Intent No. #175 662
al Permit No. or Date -

State Well No.
Other Well No.

) OWNER: Name United States Dept. of Interior Yosemite National Park
dress 255 Parfet Street
 Denver, Colorado Zip 80225

) LOCATION OF WELL (See instructions):
unty Mariposa Owner's Well Number #2 (completed) (site #1)
ll address if different from above El Portal, Calif.
wnship Range Section
tance from cities, roads, railroads, fences, etc. New 10" well (2nd completed well) Site #1, Approx 130' west of Road Entering El Portal Trailer Park, and Approx 150' North of Highway 140 Pavement.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☑ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

Note site #2

(4) PROPOSED USE:
Domestic ☑
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

) EQUIPMENT:
tary ☐ Reverse ☐
ble ☑ Air ☐
her ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☑ Size
Diameter of bore
Packed from to ft.

) CASING INSTALLED:
eel ☑ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen (Johnson Screen)

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0'	45'6"	10 3/4	.365	43'	68'9"	(25'9" long)
10 3/4" casing left 2' above ground						

0' → 45' 14" x .375 wall, (note, 14" left 4" above ground = 45'4" total length)

43' - 44'9" = 20 slot
44'9" - 52'9" = #90 slot
52'9" - 61'9" = 20 slot
61'9" - 65'9" = #20 slot
65'9" - 68'9" = 20 slot

) WELL SEAL:
as surface sanitary seal provided? Yes ☑ No ☐ If yes, to depth 45' ft.
ere strata sealed against pollution? Yes ☐ No ☐ Interval ft. (Cement)
ethod of sealing

10) WATER LEVELS:
epth of first water, if known 22' ft.
anding level after well completion 6' ft.

11) WELL TESTS:
as well test made? Yes ☑ No ☐ If yes, by whom?
pe of test Pump ☑ Bailer ☐ Air lift ☐
epth to water at start of test 6 ft. At end of test 6 ft
ischarge 45 gal/min after 8 hours Water temperature
emical analysis made? Yes ☑ No ☐ If yes, by whom? Moore Lab
as electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 77' ft. Depth of completed well 68'9"

from ft.	to	ft. Formation (Describe by color, character, size or material)
0	4	Top Soil
4	14	Boulders
14	22	packed Gravel
22	24	Loose Gravel / 5 1/2' water
24	46	Dry Boulders and Packed Gravel
46	52	loose Gravel (14' water T
52	55 1/2	Dry Cemented Boulders
55 1/2	63	Blue Granite - Bedrock
63	65	Medium (Brownish) Sand (10' water Tab
65	69	Brown Granite
69	72	Blue Granite
72	77	Quartz (HARD)

Work started 6/27 1980 Completed 8/1 1980

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED M. E. Seebeck Jr.
(Well Driller)
NAME M. E. SEEBECK & Sons
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 552
City Clarksburg, Calif. Zip 95612
License No. 277691 Date of this report 8/13/80

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Well #2

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

TRIPLICATE
Retain this copy

Do Not Fill In
Nº 76399
State Well No.
Other Well No.

El Portal

(1) OWNER:
Name U. S. Dept. of Interior
National Park Service
Water Resources Section
Address 450 Golden Gate Ave. - Box 36025
San Francisco, Calif. 94102

(2) LOCATION OF WELL:
County Mariposa Owner's number, if any El Portal
Township, Range, and Section Twp. 3S, Rg. 20E, Sec. 17
Distance from cities, roads, railroads, etc. About 40' east of Merced
er at a point about 200 yds. downstream from
El Portal Bridge on Hwy. 140

(3) TYPE OF WORK (check):
New Well ☒ Deepening ☐ Reconditioning ☐ Destroying ☐
If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☐
Cable ☒
Other ☐

(6) CASING INSTALLED:
STEEL: OTHER:
SINGLE ☐ DOUBLE ☐
& 10" Dbl. 16" from 5' to 29'
Sglo.16" from Up 3' to 5'

				If gravel packed		
From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
3'	55'	10"	Sch.40	16"	0	55
3'	7'	24"	66			
3'	29'	16"	46			

Size of shoe or well ring 16"x12"x1 3/8" Size of gravel: Monterey 48
Describe joint Buttwelded

(7) PERFORATIONS OR SCREEN:
Type of perforation or name of screen Johnson Screen

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
45	55	Johnson Stainless Steel Screen -- .045 slot		

(8) CONSTRUCTION:
Was a surface sanitary seal provided? Yes ☒ No ☐ To what depth 10' ft.
Were any strata sealed against pollution? Yes ☐ No ☒ If yes, note depth of strata
From ft. to ft.
From ft. to ft.
Method of sealing Cement

(9) WATER LEVELS:
Depth at which water was first found, if known 10' ft.
Standing level before perforating, if known ft.
Standing level after perforating and developing ft.

(10) WELL TESTS:
Was pump test made? Yes ☒ No ☐ If yes, by whom? Belknap
Yield: 76 gal./min. with 37 ft. drawdown after 10 hrs.
Temperature of water Was a chemical analysis made? Yes ☒ No ☐
Was electric log made of well? Yes ☐ No ☒ If yes, attach copy

(11) WELL LOG:
Total depth 105 ft. Depth of completed well 55 ft.
Formation: *Describe by color, character, size of material, and structure*

0	15	Top soil and boulders
15	42	Gravel, sand, cobbles, some D.G. and silt
42	43	Decomposed granite and clay
43	48	Gravel, sand, cobbles
48	49	Soft - sand or decomposed granite
49	55	Sand and gravel or loose D. G.
55	105	Granite with soft layers at 60', 85' and 92'

Work started 11/27/72 Completed 7/10/73 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Bill Belknap JA
(Person, firm, or corporation) (Typed or printed)
Address P. O. Box 866
Reedley, California 93654
[SIGNED]
(Well Driller)
License No. 115333 Dated 7/21/73, 19

SKETCH LOCATION OF WELL ON REVERSE SIDE

DWR 188 (REV. 9-68)

USGS Well # 3S/2 E-17EA

(Well #4
Site #4) (extra well)

LATE
er's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. **075821**

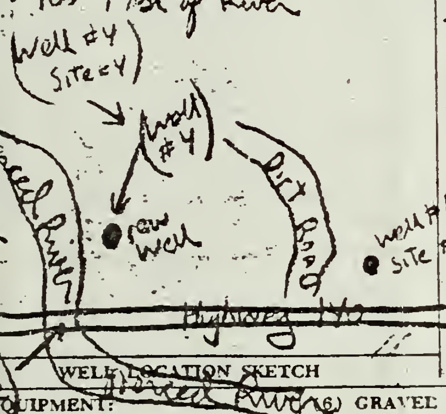
State Well No.
Other Well No.

of Intent No. #175662
ermit No. or Date —

Yosemite National Park

OWNER: Name United States Dept of Interior
255 Parfet Street
Denver, Colorado Zip 80225

LOCATION OF WELL (See instructions):
Mariposa Owner's Well Number (#4 site #4)
ldress if different from above EL Portal Calif.
ip Range Section
e from cities, roads, railroads, fences, etc.
New 10" well on East Bank of Merced River, Approx 300' Downstream From Current Bridge over Merced River on Highway 140 in EL Portal.
Approx 300' north of Highway & 100' East of River



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☑ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☑
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

QUIPMENT:
☐ Reverse ☐
☑ Air ☐
☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size
Diameter of bore 14
Packed from ft.

ASING INSTALLED:
Plastic ☐ Concrete ☐

(8) PERFORATIONS: (Johnson Screen)
Type of perforation or size of screen

m	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
	50	15 3/4	.365	48	67	(Total = 19' long)
14" left 2' above ground)						

VELL SEAL: 0-50' 14" .375 wall
urface sanitary seal provided? Yes ☑ No ☐ If yes, to depth 50' ft.
strata sealed against pollution? Yes ☐ No ☐ Interval ft.
l of sealing (Cement)

WATER LEVELS:
of first water, if known ft.
g level after well completion 19' ft.

WELL TESTS:
ell test made? Yes ☑ No ☐ If yes, by whom?
f test Pump ☑ Bailer ☐ Air lift ☐ (18gpm with 30' drawdown)
to water at start of test ft. At end of test ft
ge 48 gal/min after 19 hours Water temperature
al analysis made? Yes ☐ No ☐ If yes, by whom? Morse | AB
ectric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 70' ft. Depth of completed well 67' ft.
from ft. to ft. Formation (Describe by color, character, size or material)
0 - 7 Large Boulders
7 - 14 Small Boulders - Sand
14 - 18 Cobbles
18 - 21 Cobbles with some Gravel
21 - 24 Gravel
24 - 30 Boulders with Sand & Gravel - no H2O
30 - 36 Cemented Brown Sand & Gravel
(Impervious - no H2O)
36 - 42 Sand & Gravel - Dry - Brown Clay
42 - 46 Packed (Dry) Gravel & Brown Clay
46 - 51 Very HARD GRANITE
Shelf - "Black Horse"
51 - 54 Coarse Sharp Sand - 20' water
54 - 57 Sand Pea Gravel & Brown Clay
57 - 58 HARD Solid Rock (20' water
58 - 63 Brown HARD Clay with Sand
& Gravel (20' water table)
63 - 65 Sand & Gravel (19' water table,
65 - 70 Bedrock

(# slot 48-50'
#40 slot 50-54'
#60 slot 54-56½
#80 slot 56½-64'
slot 64-67')

Work started 11/24 1980 Completed 2/5 1981

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED M E Seebeck Jr.
(Well Driller)
NAME M E SEEBECK & Sons
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 552
City Clarksburg, CALIF. Zip 95612
License No. 277691 Date of this report 2/5/81

88 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

(Bill Matteson copy)

M. E. SEEBECK & SONS
JOB TIME CARD

CUSTOMER (Well #4) (Site #4)

ADDRESS

DATE NOTIFIED:

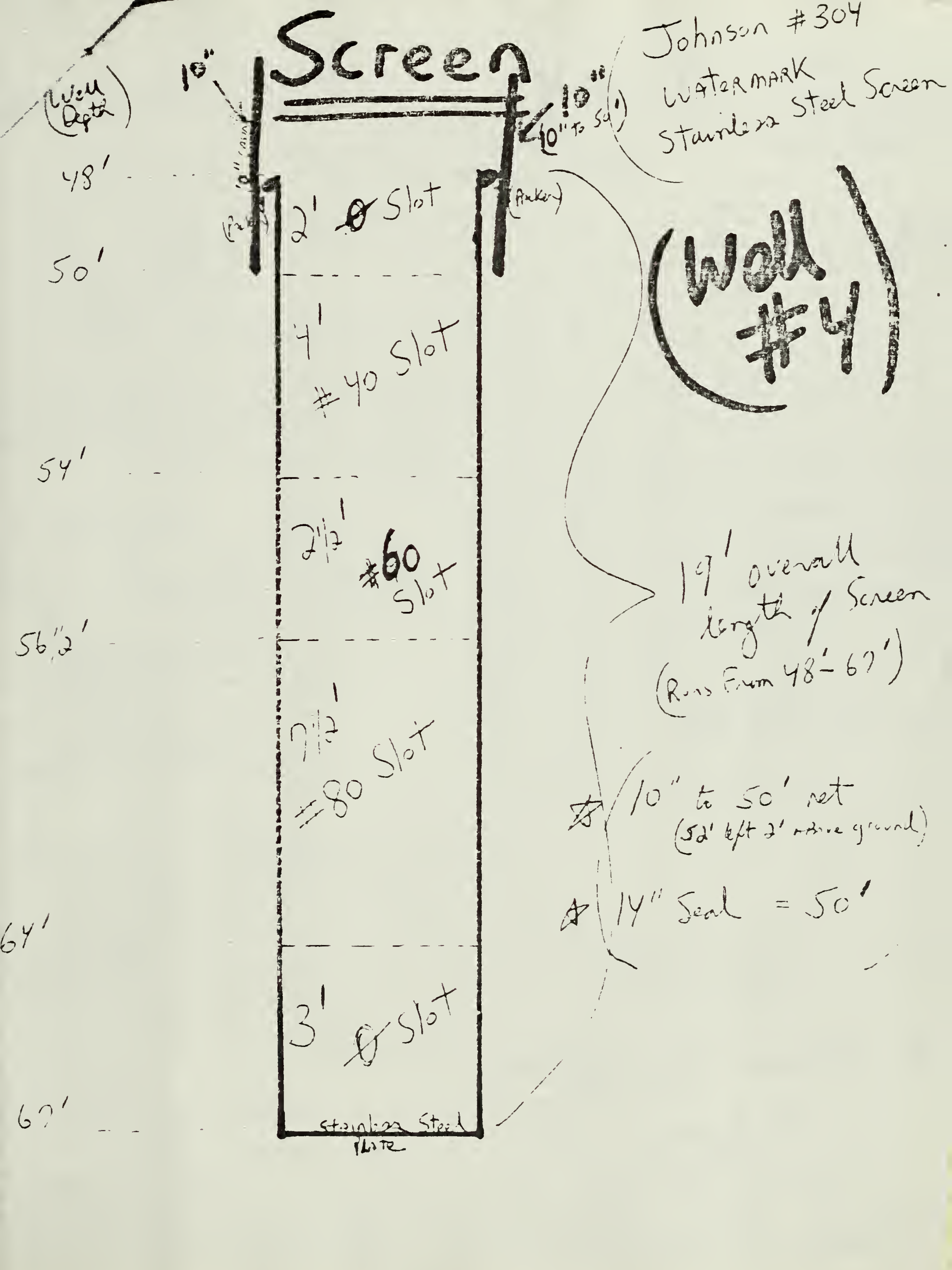
WORK TO BE DONE (11/24/80 - 2/5/81)

LABOR & MATERIALS

(Well log)

7' Large Boulders
14' Smaller Boulders, some sand
18' Cobbles
21' Cobbles with some Gravel
24' Gravel
30' Boulders with Brown Packed Sand & Gravel (impervious)(no water)
36' Brown Sand & Gravel -(impervious)- Cemented (no water)
42' Brown Clayish Sand & Gravel -(Little Hole) -(Dry)
46' Packed Gravel & Brown Clay - no water
51 Very HARD Granite Shelf ("Black Horse")
54 Coarse Sharp Sand - (20' water Table)
57 Sand, Pea gravel & Brown Clay (20' water Table)
55 Still Black shelf - Very HARD ("Black Horse")
63' HARD Brown Clay with Sand & gravel (20' water Table)
65' Sand & GRAVEL (water Table = 19')
70' Very HARD Bedrock

(10" casing = 50' at (50' [illegible])
14" annular Seal = 50')


Screen
Johnson #304
WATERMARK
Stainless Steel Screen
(Well Depth)
10"
10"
(10" to 50')
10" casing
(Packer)
(Packer)
48'
2' 0 Slot
50'
4' #40 Slot
54'
2½' #60 Slot
56½'
7½' #80 Slot
64'
3' 0 Slot
67'
Stainless Steel Plate
(Well #4)
19' overall length of Screen
(Runs From 48'-67')
☆ 10" to 50' set
(52' left 2' above ground)
☆ 14" Seal = 50'

PLICATE
iller's Copy (Well #1 (completed) (Site #2))

STATE OF CALIFORNIA Yosemite
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

4 wells
5/1/80 - 2/5/81
Do not fill in
No. 075898

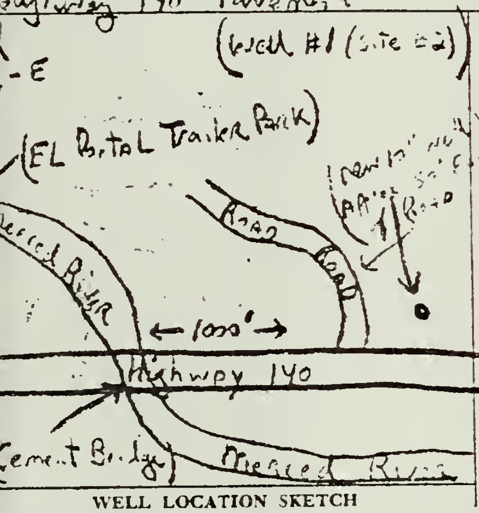
State Well No.
Other Well No.

ice of Intent No. #125662
al Permit No. or Date -

Yosemite National Park

) OWNER:
Name United States Dept. of Interior
ress 755 Parfet Street
Denver Colorado Zip 80225

) LOCATION OF WELL (See instructions):
nty Mariposa Owner's Well Number #1 (site #2)
ll address if different from above EL Portal Calif.
vnship Range Section
tance from cities, roads, railroads, fences, etc. New 12" well Approx. 1000' East of Cement Bridge over Merced River on Highway 140 in EL Portal - well approx. 30' north of Highway 140 Pavement



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☑ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☑
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

) EQUIPMENT:
tary ☐ Reverse ☐
ble ☑ Air ☐
her ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☑ Size
Diameter of bore
Packed from to ft.

) CASING INSTALLED:
el ☑ Plastic ☐ Concrete ☐

(8) PERFORATIONS: (Johnson Screen)
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	50'5"	10 3/4	.365	48'	66'	Ftal Screen (18' long) → (8 slot 48'-51' F80 slot 51'-63' [illegible] slot 63'-66')
3/4 (casing Left 2' up						
Above ground)						

) WELL SEAL: 0' - 50'4" 14" x .375 wall
as surface sanitary seal provided? Yes ☑ No ☐ If yes, to depth 50'4" ft.
ere strata sealed against pollution? Yes ☐ No ☐ Interval (Cement) ft.
ethod of sealing

0) WATER LEVELS:
pth of first water, if known - ft.
anding level after well completion 13' ft.

1) WELL TESTS:
as well test made? Yes ☑ No ☐ If yes, by whom?
pe of test Pump ☑ Bailer ☐ Air lift ☐
pth to water at start of test 13' ft. At end of test 13' ft
scharge 100 gal/min after 8 hours Water temperature
emical analysis made? Yes ☑ No ☐ If yes, by whom? Morse LAB
as electric log made? Yes ☐ No ☑ If yes, attach copy to this report

(12) WELL LOG:
Total depth 88' ft. Depth of completed well 66 ft.

from ft	to ft	Formation (Describe by color, character, size or material)
0	3	Sandy loam
3	8	Boulders
8	9	loose Sand & Gravel
9	14	Boulders
14	34	loose Gravel To 6" (2' Boulders
34	44	Reddish Sand & gravel (Boulders to 3
44	52	Impervious Sand, gravel & Boulders
52	56	loose Sand & Gravel (To 3/4")
56	61	Gravel with Some Brown Clay
61	63	loose Gravel to 2'
63	83	HARD Brown Clay - Rock Mixture
83	88	Solid Rock

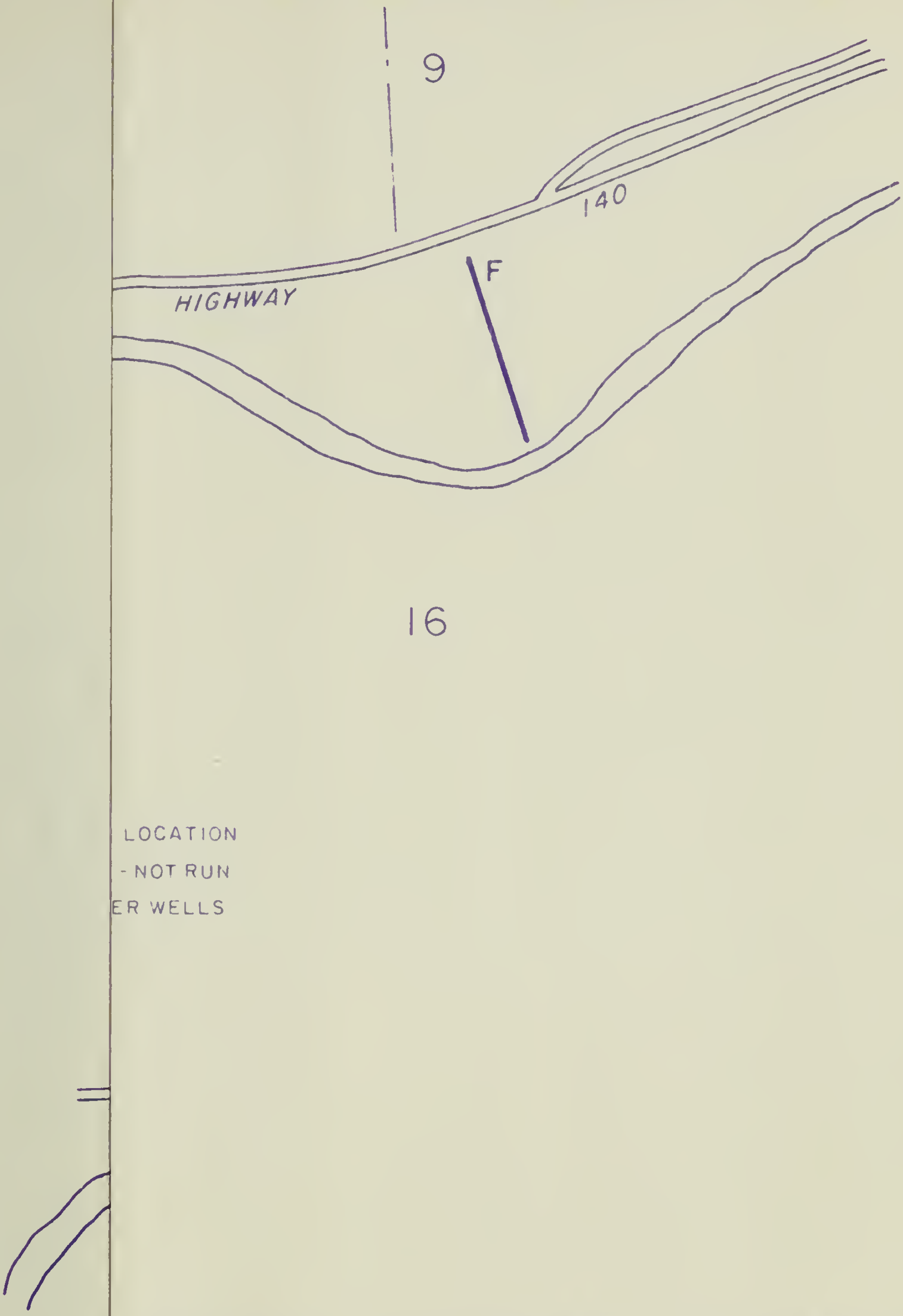
Work started May 1 19 80 Completed 6/25 19 80

WELL DRILLERS STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED M. E. Seebeck Jr.
(Well Driller)
NAME M. E. SEEBECK & Sons
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 552
City Clarksburg Calif. Zip 95612
License No 227691 Date of this report 8/13/80

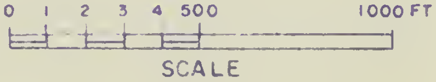
WR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

FIGURE I



GEOLOGIC AND SEISMIC RECONNAISSANCE

WATER SUPPLY FOR YOSEMITE PARK
EL PORTAL AREA



ALVIN L FRANKS, Ph D
ENGINEERING / ENVIRONMENTAL GEOLOGY

FIGURE 1

GEOLOGIC AND SEISMIC RECONNAISSANCE
WATER SUPPLY FOR YOSEMITE PARK
EL PORTAL AREA

ALVIN L. FRANKS, Ph.D
ENGINEERING / ENVIRONMENTAL GEOLOGY